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ABSTRACT

The Open University is recognized as a model of innovation in higher education, not merely for advances in the use of communications technology, but also for demonstrating the applications of such principles of technology as systems design, division of labor, and management by objectives to the educational tasks of course development, instruction, and learner support. Some of the lessons that can be learned from experience with the Open University in Great Britain are the following: (1) new technology means new structures--higher education can be available to many more people and on adult terms; (2) course design includes study guides, textbooks, films, radio programs, audio- and videotapes, and computer-based activities--all elements that can be incorporated in other programs; (3) a learner support system is vitally important--such a system is facilitated through correspondence study; (4) mass-produced course materials require individualized instruction; and (5) various types of communications media are available, and all should be used for their best features. (14 references.) (KC)

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NEW TECHNOLOGY: LESSONS FROM THE OPEN UNIVERSITY

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The Open University is recognized as a model of innovation in higher education, not merely for advances in the use of communications technology, but also for demonstrating the application of such principles of technology as systems design, division of labor, and management by objectives, to the educational tasks of course development, instruction, and learner support.

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Lesson One: New Technology Means New Structures

The Open University is also recognized and widely emulated, as an important social invention. New technology does not mean just communications hardware, nor even new instructional techniques that such hardware makes possible. New technology is also the educational structure that has to be established before either the communications technology or the instructional technologies can be employed. The Open University is such a new technology. It is a new way of organizing education, invented as a result of new educational needs on the one hand and the availability of new communications and instructional technologies on the other.

The need it meets is the need of those who had no higher education in their youth. As the "University of the second chance,", it promotes social equality, gives new employment possibilities, and is a means of individual self-fulfillment. It is a force for national economic and technical development; it trains the underdeveloped sectors of the labor force, and provides continuing professional education for the more highly educated. This is done without withdrawing the adult learner from his/her normal position in society. British institutions of higher education have found it impossible to accommodate the special needs of adult learners in large numbers. In particular they normally require the physical presence of the learner on a campus at a time that is convenient for educators, but extremely inconvenient for people whose primary occupation is worker or homemaker. For this reason the Open University was first conceived as a "university of the air," and then as a university with instruction through a mixture of broadcast, print and other comunications media. Learning occurs where the learner is. Instruction originates at the University. Communication is through technology.

No country provides more opportunities for the adult to return to higher education or to continue learning afterwards than the United States. Nevertheless, only about 12% of adults take advantage of these opportunities. (National Center for Educational Statistics, 1980) Among the deterrents to participation are the scheduling, travel and family

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problems involved with attending class on campus, as well as youth-oriented rules and procedures, teaching styles, and perhaps curricula. An important lesson of the Open University experience is that there exists a reservoir of potential learners awaiting the invention of a system that makes higher education available on the adult's terms.

The needs of such learners in this country are to some extent met by the Extension Departments of our universities. These departments will be more successful if they form collaborative arrangements with institutions beyond their own universities, since it is not possible to deliver media-based education of high quality except by taking advantage of the economies of large-scale production. The alternatives facing American universities are clear. Each Extension Department can "go it alone" and produce a full range of courses for a limited market, investing the few thousands of dollars provided by its parent institution and teach, as is usual when funds are limited, through one or two media, with a minimal learner support system. Alternatively, by specializing in the production of fewer courses, for national or regional markets, the same institutions might approach the million-dollar course budgets that are common at the Open University and so employ a full range of media and learner support services. The lesson from the Open University is unequivocal: distance education of high quality depends on large enrollments, large investments, the specialization of high-level manpower, and the application of the principles of large-scale production.

Lesson Two: The Technology of Course Design

The Open University course includes a study guide, a textbook, eight or more television films, and an equal number of radio programs, (both of which can be delivered on tape) supplementary audio or video tapes, and computer-based activities; in many courses materials are sent to the student in what are called "home experiment kits." In addition, provision is made for the submission of written papers and for correspondence between learners and an instructor, for counseling on an individual basis, for telephone communication, and for occasional face-to-face meetings between learners, instructors, and counselors.

In the design of every course, each of these elements is represented by one or more specialists, who, together with several academics specializing in the content of the course, make up what is called the course team. This team, usually between ten and twenty persons, works full-time for between two and three years to produce a course. Each academic writes a section of the study guide and the course reader and designs tests and exercises with the aid of an educational technologist. Broadcasts are prepared with the help of radio and television producers; notes for correspondence instructors are written with the assistance of a specialist adult educator. Typically, three drafts of every text are written, each being discussed by the whole team, and the later ones incorporate the suggestions made at course team meetings. Perry (1976) has stated that "A course produced

by this method will inevitably tend to be superior in quality to any course produced by an individual." While this is true, the course team approach to course design is very expensive, so in recent years thought has been given to producing courses more cheaply by "lean course teams". (Stringer, 1980). However, the lesson from the Open University is that there must be at least three specializations in course design. As well as the academic, whose contribution is knowledge of the field or discipline to be taught, there has to be a media specialist when video, audio recordings, broadcasts, study guides, or correspondence instruction are to be used. There must also be an adult educationist who can ensure that the academic content is organized in ways that will maximize learning. This person attends to such items at the statement of objectives and the weight and pace of instruction in each lesson, the procedures for both student self-evaluation and external evaluation, and perhaps most importantly, the fullest integration of all elements of the instructional package, and appropriate use of each medium. In distance education in the U.S.A., it sometimes appears that the academic must not only keep abreast of a field of knowledge, but be a specialist in communications and course design also. It is impossible to produce well-designed distance learning materials of great sophistication for large-scale use, without major support from technical specialists.

In Britain, some 40,000 people apply each year for only 20,000 places in the Open University. A primary cause of the recognition and acceptance that is implied by this demand--which should be noted by other distance education systems--is the University's insistence, in fact as well as in word, on establishing and then protecting the highest academic standards. Towards this end, drafts of course materials are subjected to intensive examination, and to validation by a range of external academics. Since course materials will be open to public scrutiny, no hint of inadequacy should be available to the die-hard critics who might want to show that media-based teaching is inferior to the traditional. The Open University competes with other Universities for the most eminent academics, and does not, as is sometimes the case in American universities, relegate distance teaching to the more junior members of the faculty, or as an add-on activity to the academic's regular employment.

Lesson Three: The Vital Importance of A Learner Support System

Research at the Open University provides evidence that adult learners vary greatly in their motives for learning, in the strength of those motives, in the ways they prefer to learn, and the problems both academic and personal, which impede their learning. Teaching begins with programs that are mass produced, and not all learners are able to adapt these materials to their own needs. For these reasons, Open University opinion is that a counseling and instructional system that is easily accessible to the learner is a main ingredient for success in distance education. Central to the university's educational system is the use of correspondence teaching. Therefore, the learner support system consists of more than 5,000 part-time staff, both counselors and

correspondence instructors, known as tutors. After admission, every Open University student is allocated to one of this network of part-time counselors. The counselor provides assistance in dealing with academic problems and with the University's administration; (it should be remembered that all administrative procedures such as registration, tuition payments, and course selection are negotiated by mail, so misunderstandings can and do occur). Other problems that are commonly brought to Open University counselors include anxiety about returning to learning, domestic tensions, and concerns about changing career directions resulting from university study. The University provides as much information as is possible to the potential student through print and other media, and at meetings of applicants and their families and friends if they wish. Every application form is scrutinized as part of an Admissions Advisory Service, and applicants who are perceived as being at risk are offered individual counseling. Of those persons who finally register in the University, some 83% complete their courses (Woodley and Parlett, 1983), and a major factor contributing to this high completion rate is the University's counseling service. The lesson from this Open University experience is that higher education that employs new technology in meeting the needs of large numbers--that is a system of mass education--where there is distance between the educator and the learner, must make provision for giving advice and support to each individual learner. The result is a reduced likelihood of subsequent dropout, with its concomitant personal distress, negative reflection on the university and financial loss to both the individual and the institution. (Sewart, 1981).

Lesson Four: Mass Produced Course Materials Require Individualized Instruction

As well as receiving a body of knowledge through print and other media, distant learners are entitled to guidance in their efforts to understand, acquire, and work with the knowledge. This element of study guidance is the most important distinction between an educational program and other forms of communication. In an Open University course, much of the assistance that is given by the teacher in the university classroom is incorporated in the materials produced by the course team. They provide a statement of aims and objectives for the course and its different sections, strategies for learning the concepts of the course, structures to enable the learner to reach understanding of the inter-relationships among the various concepts presented, and encouragement to the learner to sustain motivation to learn. However, learners also need to do something with the information received in their media package, so the package is designed to give the opportunity for writing of two kinds. Informal exercises give occasion to reflect, to summarize and synthesize, to analyze and consider what has been raised in the course. More formal assignments are submitted to an instructor. These require a sustained and disciplined effort of writing, one of the essential and most valuable elements of study in higher education. This student-teacher interaction is through the postal system. It is hardly ever with the academic who wrote the instructional package, but is with one of the

team of local tutors in that particular subject area. The tutor not only awards a grade that contributes to the student's grade for the course, but also uses the written work as a trigger for further instruction. This might take the form of questions for the learner's further consideration, a correction of a misunderstanding, an alternative view, or suggestions for further reading. The lesson from the Open University is that good distance education requires a partnership between centrally produced course materials and equally excellent individual instruction by correspondence or other interactive medium. (Perraton, 1974) (Kelly and Swift, 1981)

Lesson Five: Some Lessons About Communications Media

One of the most significant changes in communications media at the Open University is the decline of television and radio broadcasting and substitution of audio and video tape distribution. The advantages of television are well-known; it gives the student a view of activities that are too expensive for direct experience, such as expensive experiments, overseas field visits, microscopic observations, and industrial processes; it give insight into a wide range of social and personal interactions, as well as drama, archive film, and interviews with politicians, researchers and educators. Broadcasting television has distributional advantages over other forms of television such as cable, satellite, cassette, and discs, since in developed countries virtually everyone can see broadcast transmissions. The limitations of broadcast television that have been experienced by the Open University include not only difficulty in obtaining transmission times that are convenient for the learners, but broadcast television has been found to have certain educational weaknesses. Programs are ephemeral, since they cannot be reviewed or interrupted; they elicit a passive response, and are usually too open-ended and loosely structured for rigorous study. Properly used, they give students the opportunity to practice the high level skills of analysis, of applying abstract principles to real world situations, of evaluation and generalization. However, it has been found that students have great difficulty in using television programs in these ways. The problem lies only in part with the students, and is partly the responsibility of broadcasters. As Bates points out: "The programs themselves need to be structured in ways that help the development of such skills, but making programs this way tends to be contrary to the production styles generally used in educational broadcasts." (Bates, 1984)

In recent years, the Open University has provided a video cassette loan service to make programs that were prepared for broadcasting available on a mail order basis. This has resulted in a large increase in the viewing rates for these programs. Cassette viewers report that the cassettes enabled them to achieve greater understanding of the material presented. (Brown, 1984) The advantage of video cassettes over broadcasting is that of increased student control. The student can watch when she wants, as often, and with as many pauses or replays as necessary. Even with video cassettes students tend to follow the

storyline of a program and concentrate on the factual content rather than attempt to analyze the relationships or underlying messages contained in it. However, the ability to handle such materials can be enhanced by the design of the programs themselves. Programs prepared specifically for use as video cassettes rather than for broadcasting are typically divided into short sequences of a few minutes duration, and at the end of each sequence, students are directed to stop and take notes or discuss what they hve seen and heard. The programs are highly integrated, physically and conceptually, with the course texts and study guides.

As with video tapes, audio cassetes give students freedom to listen at a time and place convenient to themselves; they can stop, pause and replay, and thus organize their study approach according to personal style and preference. It is argued that cassettes give students many of the advantages of the written text. They are adaptable to such techniques as skimming and reviewing, and learners can control the pace and the methods with which they engage the particular content. Many Open University cassettes are presented in combination with visual materials. Students are asked to pause, replay, answer questions or engage in activities which the instructor builds into the tape. Activities may consist of comprehension tests or revision exercises, or may aim to develop practical skills, such as the drawing of graphs and diagrams, guided by the tutor's commentary. Visual materials include maps, geological specimens, chemical solutions, color filmstrips of paintings or architecture, and tables of statistics. The audio component is integrated into the main teaching, and students are given cross-references to the printed text. The Open University is now producing over 100 hours a year of new cassette material, and mails roughly half a million cassettes per year to students. (Durbridge, 1984)

The main areas of computer assisted learning in the Open University are computer-based tutorials, learning about statistical packages in mathematics and the social sciences, and providing simulations in science and technology. Like other institutions, the Open University has to struggle with problems arising from the incompatibility of software for the array of home micros on the market. The university sends out microcomputers to students on certain courses, and special purpose home computers have been designed for professional audiences such as managers, engineers and schoolteachers. Jones (1984) writes about the computer "there are many issues which require consideration before it can realize its potential in distance education. These include access, integration with the course, assessment, support and training for tutors." (Jones, 1984) One of the impacts of research and evaluation at the Open University has been a move away from the broad use of CAL, towards its use in specialized, highly quality pockets where it is considered particularly appropriate.

Radio broadcasting, which at the beginning of the Open University was regarded as an essential part of every course, is in decline. This decline has been parallelled by an increase in the use of audio

cassettes, mailed to students with their printed course materials. In courses that still have radio broadcasts, programs are aired late in the evening or in the early morning, and most students record them off-air. Radio is used to deliver lectures, interviews, source materials such as recordings of historic interest or music, with comments by an academic; "radio vision" is a talk illustrated by visuals such as printed diagrams and pictures or slides.

The Open University is the largest educational user of telephone conferencing in Britain, with about 1,000 hours of small group conference calls in a year. Arrangements are frequently made for tutors to speak to small groups of students in distant locations using one of the several forms of telephone amplifying devices, and teleconferencing groups are linked together to participate in seminar discussions. A proposal for the establishment of a dedicated audio teleconference system that would have been known as OUTNET was a victim of government economies in the early 1980's.

Cyclops is a shared screen technology that has been produced by an Open University research team. It consists of a terminal with a light-sensitive writing pen and an electronic digitizing pad, two telephones, one for voice communication, the other for transmitting Cyclops diagrams via a modem, and a standard TV set. Tutorials are provided to study centers that are linked via a conference bridge. Cyclops is completely interactive both in speech and in image creation. Charts, diagrams, etc. are communicated over the telephone, while students and tutors in different locations speak to each other and interact by means of the light pens and scribble pads. Each has equal access to the shared screen, and anyone can add to, alter or change what is displayed. It is this potential for group and individual intervention and interaction which makes Cyclops a useful teaching medium. (McConnel, 1982).

Several new consortia of British cable companies have declared an interest in education as a programming area, and feasibility studies for educational channels have been undertaken in major cities. Operators have approached the Open University with proposals for linking up with the commercial cable networks. There is potential for Europe-wide distance education through direct broadcast satellite, while cable offers the possibility of transmitting to smaller numbers of students than is economically possible at the present time. Important developments in this area will await the general availability of fiber-optic cable and the two-way video and audio communication it will make possible. (Boyd-Barrett, 1983). Teletext is an electronic data distribution method, using broadcast and/or cable as the transmission medium. Materials such as correspondence texts are transmitted overnight and recorded by users on a low-cost audio cassette recorder at high data rates. When two-way cable is available, teletext will become an interactive medium and thus more useful in its educational applications.

View data, sometimes called videotext, allows users to access information stored in a remote computer via the public telephone

service, and display it on a domestic television set. The Open University's own view data system, Optel, resides on a central computer, with terminals spread around the country in locations near the students. Optel provides an easy-to-use information retrieval system, and, in addition, computer-assisted learning, messaging and conference systems are possible. Eighty percent of British homes are expected to have view data access by 1990, and it is hoped Optel will provide a cost-effective use of the University's central computer. The advantages at first will be administrative, but will be followd by educational applications such as computer-assisted feedback to learners.

An Open University project team has produced a video disc in materials science, developed around an existing television program, with additiona film sequences and computer control that turn it into an interactive tutorial. The interactive software is designed to allow the student to take part in calculations, decision-making and problem-solving. The development of interactive video puts creative television production under the control of computer logic; this implies a dominant role for computer programmers compared to television producers, with a new challenge for the Open University to provide support for computing services comparable to the large investment in television.

Among the lessons the Open University has learned about new media is the realization that there is no super medium. Each medium serves a different function. The media vary in their suitability for dealing with the subtle interactions of different content, different learning styles, different teaching approaches, and perhaps different personalities. If there is any possible exception to the lesson of "no super medium," it is that the printed text, and the written word, carry the main burden of instruction, and are preferred to all other media by an overwhelming proportion of both students and teachers. The lesson for course designers is not to select one or two favored media, but to use a range of media in a planned and integrated manner so that a variety of educational functions and approaches can be offered. It is essential to proceed cautiously in applying so-called "new media." Many decisions in this area have been made for political reasons, or in blind response to the availability of funding, or following an individual's or institution's particular enthusiasm. Considering the large sums of money involved and the educational consequences of the decisions that have to be made, more care has to be taken and perhaps more research has to be undertaken to determine which of these media are best suited for particular educational purposes, and to use them accordingly. (Fuller, 1984).

Persons who wish to learn more about the areas which have been touched upon here are referred to Teaching at a Distance (UK), Open Learning (UK), and The American Journal of Distance Education. This latest journal in the field, focusing on developments in the Americas, makes its first appearance in Spring 1987.

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